CLAIMS

What is claimed is:

1. A method for operating a mobile station, comprising the steps of:

prior to transmitting a burst in a last frame before entering a discontinuous transmission (DTX) mode low power (DTX_Low) state, generating a message word that indicates that the mobile station is about to enter the DTX_Low state;

using a predetermined generator polynomial to produce an error detection word from the message word;

combining the message word and the error detection word into a DTX Trailer word;

convolutionally encoding the DTX Trailer word;

transmitting the DTX Trailer Word using an unused portion of a last speech or signalling word by interleaving the DTX Trailer Word in the last burst with speech or signalling word bits; and

entering the DTX_Low state.

2. A method as in claim 1, wherein the message word has a length of n bits, the error detection word is an m bit CRC that is appended to the message word to form the DTX Trailer word, and the DTX Trailer word is error protected using a fractional rate convolutional encoder.

3. A method as in claim 1, wherein the message word has a length of eight bits, the error detection word is an

eight bit CRC that is appended to the message word to form the DTX Trailer word, and the DTX Trailer word is error protected using a rate 1/8 convolutional encoder.

4. A method as in claim 1, wherein the DTX Trailer word is interleaved as a Fast Associated Control Channel burst using only odd numbered 10 bit rows in the last transmission burst before the mobile station enters a DTX_Low state.

5. A method as in claim 1, wherein the generator polynomial is a shortened version of a generator polynomial used for Analog mode voice and control channels.

6. A method as in claim 1, wherein step of convolutionally encoding employs a rate 1/8 convolutional encoder that uses a same start and end bit.

7. A method as in claim 1, and further comprising steps of:

periodically combining a Comfort Noise Parameter message with a Channel Quality Measurement message; and

transmitting the combined messages from the mobile station to the base station while in the DTX_Low state.

8. A method as in claim 7, wherein the combined messages are sent over a Fast Associated Control Channel (FACCH).

9. A method as in claim 1, and further comprising a step of:

when in the DTX_Low state, periodically transmitting an Abbreviated Slot to the base station at intervals specified by the base station.

10. A method as in claim 1, and further comprising a step of:

when in the DTX_Low state, periodically transmitting an Abbreviated Slot to the base station until the base station specifies that the mobile station is to terminate the transmission of the Abbreviated Slots.

11. A method for operating a mobile station, comprising the steps of:

prior to entering a discontinuous transmission (DTX) mode low power (DTX_Low) state, formulating a DTX Trailer word and interleaving the DTX Trailer word using unused bits of a last slot, that contains all or a portion of a Comfort Noise Block, to form a first combined message;

transmitting the first combined message from the mobile station to a base station;

entering the DTX_Low state;

periodically interleaving a Comfort Noise Parameter message with unused bits of slots containing an interleaved Channel Measurement message to form a second combined message; and

transmitting the second combined message from the mobile station to the base station while in the DTX_Low state.

12. A method as in claim 11, wherein the steps of formulating and interleaving the DTX Trailer word include the steps of:

prior to transmitting a burst in a last frame before entering the DTX_Low state, generating a message word to indicate that the mobile station is about to enter the DTX_Low state;

using a predetermined generator polynomial to produce an error detection word from the message word;

combining the message word and the error detection word into the DTX Trailer word; and

convolutionally encoding the DTX Trailer word;

interleaving the convolutionally encoded DTX Trailer word with the unused bits of the slots containing an interleaved Comfort Noise Block to form the first message.

13. A method as in claim 12, wherein the message word has a length of n bits, the error detection word is an m bit CRC that is appended to the message word to form the DTX Trailer word, and the DTX Trailer word is error protected using a fractional rate convolutional encoder.

14. A method as in claim 12, wherein the message word has a length of eight bits, the error detection word is an eight bit CRC that is appended to the message word to form the DTX Trailer word, and the DTX Trailer word is error protected using a rate 1/8 convolutional encoder.

15. A method as in claim 12, wherein the DTX Trailer word is interleaved as a Fast Associated Control Channel

burst using only odd numbered 10 bit rows in the last transmission burst before the mobile station enters the DTX_Low state.

16. A method as in claim 12, wherein the generator polynomial is a shortened version of a generator polynomial used for Analog mode voice and control channels.

17. A method as in claim 12, wherein the step of convolutionally encoding employs a rate 1/8 convolutional encoder that uses a same start and end bit.

18. A method for operating a mobile station, comprising the steps of:

prior to entering a discontinuous transmission (DTX) mode low power (DTX_Low) state, interleaving all or a portion of a first control message with unused bits of slots containing an interleaved second control message to form a first combined message;

transmitting the first combined message from the mobile station to a base station; and

entering the DTX_Low state.

19. A method as in claim 18, and further comprising the steps of, while in the DTX_Low state:

periodically interleaving all or a portion of a control or data message with unused bits of slots containing an interleaved third control message to form a second combined message; and

transmitting the second combined message from the mobile station to the base station while in the

DTX_Low state.

20. A method as in claim 19, wherein the control or data message is transmitted at intervals that are specified by the base station for transmitting the third control messages.

21. A cellular communications system comprising at least one base station and at least one mobile station, said mobile station comprising:

a controller that is responsive to a time that it is to enter a discontinuous transmission (DTX) mode low power (DTX_Low) state, for interleaving all or a portion of a first control message with unused bits of a last transmitted slot to form a first combined message;

a transmitter for transmitting the combined message from the mobile station to a base station; and

said base station comprising means for receiving and deinterleaving said first combined message for extracting said first control message and, responsive to said first control message, for determining that said mobile station is about to enter said DTX_Low state.

22. A system as in claim 21, wherein said mobile station controller operates, while in the DTX_Low state, for periodically interleaving all or a portion of a further control or a data message with unused bits of slots containing an interleaved control message to form a second combined message; and wherein said transmitter transmits said second combined message from the mobile station to the base station while in the DTX_Low state.

23. A system as in claim 22, wherein the further control or data message is transmitted at intervals that are specified by the base station for transmitting channel quality measurement (CQM) messages.

24. A system as in claim 21, wherein said controller formulates a DTX Trailer word and interleaves the DTX Trailer word with unused bits of a slot or slots containing an interleaved Comfort Noise Block to form said first combined message.

25. A system as in claim 24, wherein said controller formulates said DTX Trailer word by generating a message word to indicate that the mobile station is about to enter the DTX_Low state; wherein said mobile station further comprises means for generating an error detection word, using a predetermined generator polynomial, from the message word; said controller combining the message word and the error detection word into the DTX Trailer word; and said mobile station further comprises means for convolutionally encoding said DTX Trailer word and for interleaving said convolutionally encoded DTX Trailer word with unused bits of a last transmitted slot before entering said DTX_Low state.

26. A system as in claim 25, wherein the message word has a length of n bits, the error detection word is an m bit CRC that is appended to the message word to form the DTX Trailer word, and said error detection word generating means is comprised of a fractional rate convolutional encoder.

27. A system as in claim 25, wherein the message word has a length of eight bits, the error detection word is an eight bit CRC that is appended to the message word to form the DTX Trailer word, and said error detection word

generating means is comprised of a rate 1/8 convolutional encoder.

28. A system as in claim 25, wherein the DTX Trailer word is interleaved as a Fast Associated Control Channel burst using only odd numbered 10 bit rows in the last transmission frame before the mobile station enters the DTX_Low state.

29. A method for operating a mobile station, comprising the steps of:

prior to transmitting a burst in a last frame before entering a discontinuous transmission (DTX) mode low power (DTX_Low) state, generating a message word that indicates that the mobile station is about to enter the DTX_Low state;

transmitting the message word using an unused portion of a last speech or signalling slot by interleaving the message word with speech or signalling word bits; and

entering the DTX_Low state.

30. A method as in claim 29, wherein the message word is represented as a predetermined bit pattern.

31. A method as in claim 30, wherein the predetermined bit pattern is transmitted without being convolutionally encoded.

32. A method as in claim 30, wherein the predetermined bit pattern is transmitted without error detection bits.

33. A method for operating a mobile station in a

circuit switched mode, comprising the steps of:

generating a data word; and

transmitting the data word using an unused portion of a slot, containing an interleaved signalling word, by interleaving the data word with the signalling word.

34. A method as in claim 29, wherein the signalling word conveys radio channel measurement information from the mobile station to a base station.

35. A method as in claim 29, wherein the data word conveys a user-entered keystroke.

36. A method for operating a mobile station, comprising the steps of:

prior to entering a discontinuous transmission (DTX) mode low power (DTX_Low) state, transmitting a Comfort Noise Block, without interruption, and all pending Fast Associated Control Channel (FACCH) messages from the mobile station to a base station;

entering the DTX_Low state; and

when in the DTX_Low state, periodically transmitting an Abbreviated Slot to the base station at intervals specified by the base station.

37. A method as in claim 36, wherein the step of entering the DTX_Low state includes the preliminary steps of:

prior to transmitting a burst in a last frame before entering the DTX_Low state, generating a message word

that indicates that the mobile station is about to enter the DTX_Low state;

using a predetermined generator polynomial to produce an error detection word from the message word;

combining the message word and the error detection word into a DTX Trailer word;

interleaving the DTX Trailer word with a speech or a signalling word;

transmitting the interleaved DTX Trailer word to a base station; and

entering the DTX_Low state.

38. A method as in claim 37, wherein the message word has a length of n bits, the error detection word is an m bit CRC that is appended to the message word to form the DTX Trailer word, and the DTX Trailer word is error protected using a fractional rate convolutional encoder.

39. A method as in claim 37, wherein the message word has a length of eight bits, the error detection word is an eight bit CRC that is appended to the message word to form the DTX Trailer word, and the DTX Trailer word is error protected using a rate 1/8 convolutional encoder.

40. A method as in claim 37, wherein the DTX Trailer word is interleaved as a Fast Associated Control Channel burst using only odd numbered 10 bit rows in the last transmission burst before the mobile station enters a DTX_Low state.

41. A method as in claim 37, wherein the generator

polynomial is a shortened version of a generator polynomial used for Analog mode voice and control channels.

42. A method as in claim 37, wherein step of convolutionally encoding employs a rate 1/8 convolutional encoder that uses a same start and end bit.